REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-66 are presently active. Claims 1, 32, 63, and 66 have been presently amended.

In the outstanding Office Action, Claims 1-25, 32-56, and 63-66 were rejected under 35 U.S.C. § 102(e) as being anticipated by Sonderman et al (U.S. Pat. No. 802,045). Claims 26-28 and 57-59 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sonderman et al in view of Fatke et al (U.S. Pat. Appl. No. 200510016947).

Firstly, Applicants acknowledge with appreciation the courtesy of Examiner Siek to conduct an interview in this case on May 9, 2005. During the interview, the issues identified in the outstanding Office Action were discussed, as substantially summarized herebelow.

During the interview, it was pointed out that, while there is disclosure of various models (e.g., the device physics model 310, the process model 320, and the equipment model 330) in Sonderman et al, these models are not disclosed as first principles models. While Sonderman et al disclose that the models can be used to produce a theoretical semiconductor wafer, the produced theoretical semiconductor wafer is not disclosed as having been produced from a first principles model. Indeed, the use of a theory in general reduces the complexity of the process being modeled by assumptions that simplify the mathematics and allow a finite solution (i.e., an algebraic function) to be produces that closely mimics or "emulates" reality. Indeed, Sonderman et al disclose that:

> Turning now to FIG. 3, a block diagram depiction of one embodiment of the simulation environment 210 is illustrated. In one embodiment the simulation environment 210 comprises a device physics model 310, a process model 320, and an equipment model 330, which are interfaced with a simulator 340. The models 310, 320, 330 are capable of ***emulating*** the

> behavior of various components of a semiconductor manufacturing facility.[1] [emphasis added]

Moreover, for the disclosed models in Sonderman et al, these models as discussed during the interview are functional representations of the behavior of various components of a semiconductor manufacturing facility, as depicted in equations 1 and 2 in Sonderman et al, and are not related to first principles.[2]

During the interview, no agreement on patentability was reached, and the examiner suggested that the claims be amended to include some of the details discussed during the interview with regard to the application of first principles equations, as described in the specification in numbered paragraphs [0040] and [0041].

Accordingly, in an effort to advance prosecution of this case, independent Claims 1, 32, 63, and 66 have been amended to clarify that a first principles physical model including a set of computer-encoded differential equations describing at least one of a basic physical or chemical attribute of the semiconductor processing tool is inputted and that a first principles simulation is performed using the input data and the physical model to provide a first principles simulation result utilizing a solution to the set of computer-encoded differential equations.[3]

As such, the present invention further distinguishes from the theoretical predictions or the functional representations in Sonderman et al.

Firstly, there is no disclosure in Sonderman et al as to the components included in the device physics model. However, a theoretical prediction is typically based on a pre-existing solution to a physical equation made by one form of approximation or another that allows an

[1] Sonderman et al, col. 5, lines 11-17.
[2] Sonderman et al, col. 9, lines 12-51.
[3] Support for this clarification is found in numbered paragraphs [0035], [0036], and [0040] and the recognition that the Maxwell equations, the continuity equations, the Navier-Stokes equation, the first law of thermodynamics, etc. are differential equations describing basic physics and chemistry.

algebraic solution equation to be derived. The attached reference article (from an unrelated field) shows on page 2 of 4 the distinction recognized in the art between first principle model simulations and empirical or semi-empirical models. As such, in Sonderman et al, the device physics model is likely represented by an algebraic equation and is not represented by a set of differential equations. Predictions in Sonderman et al for the resulting theoretical wafer would be made by inputting various parametric values into the algebraic equations to derive the predictions, and not made utilizing a solution to a set of differential equations describing at least one of a basic physical or chemical attribute of the semiconductor processing tool, as defined in the independent claims.

Secondly, a functional representation such as depicted in equations 1 and 2 in Sonderman et al is a learned functional response. The learned response is typically (as understood in the art) derived from a set of design experiments that maps out the sensitivities of a resultant property to a manifold of process inputs. The learned response is thus a statistically determined function (typically described in matrix form) that requires no knowledge or utilization of any of the basic physics and chemistry.

As such, Sonderman et al do not disclose or suggest that a first principles physical model including a set of computer-encoded differential equations describing at least one of a basic physical or chemical attribute of the semiconductor processing tool is inputted, and/or that a first principles simulation is performed using the input data and the physical model to provide a first principles simulation result utilizing a solution to the set of computer-encoded differential equations, as defined in the independent claims.

Thus, it is respectfully submitted that independent Claims 1, 32, 63, and 66 and the claims dependent therefrom patentably define over the applied prior art.

Consequently, in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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Enclosure: Attached Article: "1999 Casting Simulation Software Survey"

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